

Student Name \_\_\_\_\_



# SOUTH SYDNEY HIGH SCHOOL

## 2002 MATHEMATICS

### YEAR 11 EXTENSION 1

**Instructions :**

**Time Allowed:** 1 hour

- Attempt ALL questions.
- ALL questions are **not** of equal value.
- All necessary working should be shown.
- Marks may be deducted for poorly arranged or missing working.
- Write your Name on every page.
- Board-approved calculators may be used.

Question 1 (10 marks)	Marks
(a) Evaluate: $\sqrt{\frac{23.6+58.32}{0.2 \times 1.6}}$	1
(b) Find the value of $\left(\frac{4}{17}\right)^{\frac{2}{3}}$ to two decimal places	2
(c) Express $\frac{5}{11}$ as a recurring decimal	1
(d) Change 60 metres per second to kilometres per hour. Express your answer in scientific notations.	2
(e) By showing all necessary working, change $0.\dot{1}\dot{7}$ as a rational number.	2
(f) An Eastern Suburb property which was sold for \$850 000 gained 40% on its reserved price. What was the reserved price to the nearest dollar?	2

**Question 2 (12 marks)**

(a) Simplify the following expressing your answers with positive indices	4
(i) $(x^2y)^3(xy)^{-4}$	
(ii) $\sqrt{\frac{a}{b^{-3}}} \times \sqrt{\frac{b}{a^{-1}}}$	
(b) If $\frac{X^3Y^2}{Z^4} = \frac{3^p}{10^q}$ , where $X = \frac{2}{5}$ , $Y = \frac{27}{125}$ , $Z = \frac{4}{15}$ , find the values of $p$ and $q$ .	3
(c) Express the following as a single fraction:	5
(i) $\frac{x}{y} - \frac{y}{x}$	
(ii) $\frac{x+1}{2} - \frac{x+2}{4}$	
(iii) $\frac{1}{x(x-1)} - \frac{1}{(x+1)(x-1)}$	

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**Question 3 (12 marks)**

**Marks**

(a) Solve the following equations:

**6**

(i)  $4 - (5 + x) = 3x + 11$

(ii)  $\frac{3x}{4} - \frac{x-1}{3} = 1$

(iii)  $\frac{3x-1}{4} = \frac{2x+7}{3}$

(b) Factorise completely, the following expressions:

**6**

(i)  $4x^2 - 25$

(ii)  $2x^3 + 54$

(iii)  $x^3 - 2x - x^2y + 2y$

**Question 4 (20 marks)**

(a) Simplify the following by factorising where possible:

**7**

(i)  $\frac{x^2 - x - 2}{x^2 + x} \times \frac{x^2 - x}{x^2 + x - 2}$

(ii)  $\frac{x^2 - 4x}{x^2 - 6x + 5} \div \frac{x^3 - 16x}{x^2 - 7x + 10}$

(iii)  $\left(\frac{x}{y} + 1\right) \left(\frac{1}{x} - \frac{1}{y}\right) \div \left(\frac{x^3}{y^2} - x\right)$

(b) Simplify the following:

**7**

(i)  $\sqrt{125} - \sqrt{5}$

(ii)  $(4\sqrt{3} - 1)^2$

(iii)  $\frac{\sqrt{7} \times \sqrt{84}}{\sqrt{21}}$

(iv)  $(3\sqrt{5} - 2\sqrt{21})(2\sqrt{7} + \sqrt{15})$

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(c) Rationalise the denominator and simplify where possible:

6

(i)  $\frac{3}{2\sqrt{3}}$

(ii)  $\frac{5}{\sqrt{5}-2}$

(iii)  $\frac{1}{4-\sqrt{7}} - \frac{1}{4+\sqrt{7}}$

(iv)  $\frac{2}{\sqrt{3}-\sqrt{2}} + \frac{3}{\sqrt{5}+\sqrt{3}}$

**Question 5 (12 marks)**

Solve these equations:

(a)  $3x^2 - 5x + 2 = 0$

(b)  $-24 - 50x - 25x^2 = 0$

(c)  $2x + 3y = 26$  and  $x - 5y = 13$

(d)  $y = x^2 + 2x - 4$  and  $y = x + 2$



**End of test**



**Answers to March 2002 test:**

(1) (a) 16    (b) 0.38 (to 2 d.p.)    (c)  $0.\dot{4}\dot{5}$     (d)  $2.16 \times 10^2$  km/hr

(e)  $\frac{17}{99}$     (f) \$607 143 (to the nearest dollar)

(2) (a) (i)  $\frac{x^2}{y}$     (ii)  $ab^2$     (b)  $\frac{3^{10}}{2^5 \times 5^5} = \frac{3^{10}}{10^5}$ ;  $\therefore p = 10, q = 5$ .

(c) (i)  $\frac{x^2 - y^2}{xy}$     (ii)  $\frac{x}{4}$     (iii)  $\frac{1}{x(x+1)(x-1)}$

(3) (a) (i)  $x = -3$     (ii)  $x = 1\frac{3}{5}$     (iii)  $x = 31$

(b) (i)  $(2x+5)(2x-5)$     (ii)  $2(x+3)(x^2-3x+9)$     (iii)  $(x-y)(x+\sqrt{2})(x-\sqrt{2})$

(4) (a) (i)  $\frac{x-2}{x+2}$     (ii)  $\frac{x-2}{(x-1)(x+4)}$     (iii)  $-\frac{1}{x^2}$

(b) (i)  $4\sqrt{5}$     (ii)  $49 - 8\sqrt{3}$     (iii)  $2\sqrt{7}$     (iv)  $-13\sqrt{3}$

(c) (i)  $\frac{\sqrt{3}}{2}$     (ii)  $5(\sqrt{5}+2)$     (iii)  $\frac{2\sqrt{7}}{9}$     (iv)  $\frac{\sqrt{3}+4\sqrt{2}+3\sqrt{5}}{2}$

(5) (a)  $x = \frac{2}{3}, 1$     (b)  $x = -\frac{4}{5}, -\frac{6}{5}$     (c)  $x = 13, y = 0$     (d)  $x = 2, y = 4$ ;  $x = -3, y = -1$ .